Patent claims

1. A heat exchanger, in particular oil cooler, for motor vehicles, the heat exchanger being formed from interconnected plates, there being formed between the plates cavities which are closed off outwardly and through which a first and a second medium flow alternately in each case via at least one inflow line and outflow line, the plates being profiled in such a way that, between the respective profiles of the plates, contact points occur, in the region of which the plates are fastened to one another, characterized in that the profiles of the plates (10) and their contact points are designed in such a way that the flow, formed between the plates (10), of the first and the second medium from the corresponding inflow line to the corresponding outflow line does not run rectilinearly.

2. The heat exchanger as claimed in claim 1, characterized in that the plates (10) have a recurring wavy profile (12) which extends essentially transversely with respect to the main throughflow direction (H) and, in particular, is waved in a zigzag-shaped manner around the direction of extent.

3. The heat exchanger as claimed in one of the preceding claims, characterized in that the wavy profile (12) has legs (14) running rectilinearly between regions of curvature, the wavy profile (12) being characterized by the leg length (15) of the legs (14), by the leg angle (13) defined between the legs (14) and by the profile depth of the wavy profile.

4. The heat exchanger as claimed in one of the preceding claims, characterized in that the configuration of the wavy profile is characterized by the run of the profile in the region of the legs and of

the regions of curvature, profiles adjacent to one another recurring in a predetermined division.

5. The heat exchanger as claimed in one of the preceding claims, characterized in that the wavy profile has a flat region on the outside of a wave back.

6. The heat exchanger as claimed in one of the preceding claims, characterized in that the flat region is between 0.1 mm and 0.4 mm in a cross section of the wavy profile.

7. The heat exchanger as claimed in one of the preceding claims, characterized in that the leg angle (13) is preferably between 45° and 135°, preferably around 90°.

8. The heat exchanger as claimed in one of the preceding claims, characterized in that the profile depth is between 0.3 mm and 2 mm, in the case of liquid media preferably between 0.5 mm and 1 mm and, in particular, between 0.7 mm and 0.8 mm, and, in the case of gaseous media, is preferably in the range between 0.6 mm and 2 mm and, in particular, around 1.5 mm.

9. The heat exchanger as claimed in one of the preceding claims, characterized in that the leg length (15) is in the range of 8 mm to 15 mm and, in particular, in the range of 9 mm to 12 mm.

10. The heat exchanger as claimed in one of the preceding claims, characterized in that the wavy profile (12) is designed as an embossing in the plate (10), the plates (10) consisting preferably of a metallic material, in particular aluminum, the plates preferably being coated on at least one side with soldering aid material.

11. The heat exchanger as claimed in one of the preceding claims, characterized in that the plates (10) have as inflow lines and outflow lines in each case a pair of bores (18) perpendicularly with respect to the plate plane, the bores (18) being raised with respect to the basic plane in such a way that there is a fluidic connection from one of the two bores alternately only to every second plate interspace (20).

12. The heat exchanger as claimed in one of the preceding claims, characterized in that the raised region of at least some of the bores is surrounded by a region preferably leading around annularly and free of wavy profile.

13. The heat exchanger as claimed in one of the preceding claims, characterized in that, in the region of the bores (18) assigned to the inflow lines, distributor ducts (23) are provided, which are defined preferably by a wavy profile (12) with a leg angle which is increased, as compared with the leg angle of the wavy profile.

14. The heat exchanger as claimed in one of the preceding claims, characterized in that the bores assigned to the inflow lines are oval, elliptical or rectangular.

15. The heat exchanger as claimed in one of the preceding claims, characterized in that two plates (10) different from one another in terms of the wavy profile (12) are used alternately, the wavy profiles (12) differing from one another at least in terms of one of the features comprising leg length (15), leg angle (13) and profile depth.

16. The heat exchanger as claimed in one of the preceding claims, characterized in that the wavy profile (12) of one side of the plate (10) differs from the wavy profile (12) of the other side of the plate (10) at least in terms of one of the features comprising leg length (15), leg angle (13) and profile depth.

17. The heat exchanger as claimed in one of the preceding claims, characterized in that the wavy profiles of adjacent plates are identical to one another.

18. The heat exchanger as claimed in one of the preceding claims, characterized in that the heat exchanger is formed from a stack (21) of plates (10), the plates (10) corresponding to one another and being arranged so as to be rotated alternately through 180° with respect to one another.

19. The heat exchanger particularly as claimed in one of the preceding claims, characterized in that the plates (10) have a bent edge (17), the edges (17) of adjacent plates (10) bearing one against the other and preferably being connected to one another by brazing.

20. The heat exchanger as claimed in one of the preceding claims, characterized in that the bent edges (17) of a plurality of, in particular of up to five plates (10) mutually overlap.

21. The heat exchanger as claimed in one of the preceding claims, characterized in that the wavy profile (12) extends into the edge (17), in particular over the edge (17).

22. The heat exchanger as claimed in one of the preceding claims, characterized in that, between the

end of the wavy profile and the edge, a profile-free bending portion is formed, the width of which is smaller than 2 mm and is preferably determined in such a way that, during the brazing of the plates, the bending region is blocked with solder in wave crest portions in such a way that a throughflow of medium in the bending portion is reduced or essentially prevented.

23. The heat exchanger as claimed in one of the preceding claims, characterized in that at least one end face of the heat exchanger is assigned a closing plate (24) which is profileless, in particular, at least on the outside and which preferably has connection points (25) for a first and second medium, said connection points issuing into connecting lines and being arranged in alignment with the bores (18).

24. The heat exchanger as claimed in one of the preceding claims, characterized in that the hydraulic diameter (hD) in the main direction of extent (D) has a fluctuation of at most 25%, in particular at most 15%, in particular at most 10%, around an average value.

25. The heat exchanger as claimed in one of the preceding claims, characterized in that the hydraulic diameter (hD) has an average value of between 1 mm and 4 mm, and, in the case of liquid media, it is preferably 1 mm and 2 mm and preferably around 1.4 mm, and, in the case of gaseous media, preferably around 3 mm.

26. The heat exchanger as claimed in one of the preceding claims, characterized in that the contact points between two plates adjacent to one another are distributed uniformly over the plate surface.

27. The heat exchanger as claimed in one of the preceding claims, characterized in that the contact points between two plates adjacent to one another have a surface density of 4 to 7 per cm^2, in particular of 5 to 6 per cm^2.

28. The heat exchanger as claimed in one of the preceding claims, characterized in that a phase transition of a medium takes place in plate interspaces.

29. The heat exchanger as claimed in one of the preceding claims, characterized in that the installation position of the heat exchanger is determined such that the transverse distribution of the medium in the plate interspaces is assisted by gravitation.

30. A method for the production of a heat exchanger particularly as claimed in one of the preceding claims, characterized in that the method comprises, in particular, the steps of embossing the plates (10), of stacking the plates (10) one on the other and of fastening them to one another, preferably by brazing.

31. The method as claimed in claim 30, characterized in that the stacking of the plates one on the other takes place such that two adjacent plates (10) are in each case rotated through 180 degrees with respect to one another.

32. The method as claimed in claim 30 or 31, characterized in that brazing takes place in such a way that the plates (10) are connected sealingly to one another at their edge, a connection of adjacent plates (10) to one another at contact points of wavy profiles (12) preferably taking place at the same time.